L-05

Infrared imaging: fundamentals and applications

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From astronomy to chemical imaging to melt-pool detection to night vision – Infrared imaging (IR) has been used in a number of applications where visible imaging provided limited information. This tutorial discusses the fundamental physics and instrumentation related to imaging using infrared, the portion of electromagnetic spectrum that lies beyond the visible and below the millimeter wave. It focuses on the translation of infrared imaging techniques in nondestructive testing (NDT) and medical imaging within the purview of metrological applications related to advanced manufacturing with a particular focus on real time, in situ imaging to obtain process information. Optical, X-ray, e-beam, ultrasound or scanning probes are widely used in nondestructive testing and medical imaging. The scope of IR imaging has so far been quite limited. The purpose of this tutorial is to make the attendee aware of the far wider capabilities of IR imaging than has normally been used so far. As such, we will discuss a few case studies from our ongoing activities in the applications of IR imaging [1-6]. We will also discuss practical instrumentation issues as well as steps needed to overcome bottleneck that currently restricts wider use of IR imaging to enable rapid, real time ambient measurements.

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